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(71)Applicant : SONY CORP

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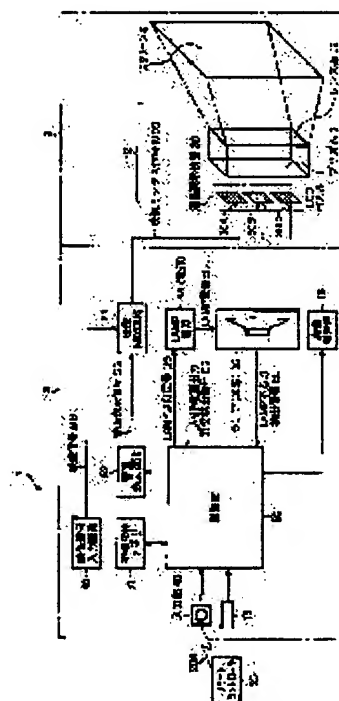
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(54) VIDEO DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To instantly and surely find out whether a light source is abnormal or a power source is abnormal by allowing a control section to receive a power source abnormal signal from the power source, when the power source is abnormal, to receive a light source abnormal signal from the light source when the light source does not light, and to instruct them to an abnormality display part to display.

SOLUTION: A lamp power source 53 detects if a high voltage output is outputted when an output of high voltage should be given and transmits a lamp power source output abnormality detection signal ES to a control section 50 when the high voltage output is not outputted. A lamp 35 knows whether is lighting or not by detecting if a current flows through the lamp 35 and transmits a lamp non-lit detection signal EL, when the lamp is not lit. An abnormality display part 16 informs a user of abnormality information which is causing a lamp non-lighting or processing information on those through the control of the control section 50 when the lamp does not light.



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CLAIMS

[Claim(s)]

[Claim 1] The display unit characterized by providing the following The graphic display machine which projects an image Power supply The light source which displays on a screen the image which turned on by the electric power supply from this power supply, and has been projected on the graphic display machine by irradiation of light The control section which receives a powerfail signal from a power supply when power supplies are abnormalities, and receives a light source unusual signal from the light source in not switching [of the light source] on the light, and the unusual display which indicates whether a power supply is unusual or the light source is unusual by the instructions from a control section

[Claim 2] An unusual display is a display unit according to claim 1 arranged at the main part of a display unit.

[Claim 3] The display unit according to claim 1 with which both screen indication of an unusual display and the image is given.

[Claim 4] For a display unit, an unusual display is a display unit according to claim 1 which is another object and is arranged at the remote controller for giving directions to a control section.

[Claim 5] The display unit according to claim 1 which receives a light source unusual signal by whether current flowed to the light source in response to the powerfail signal in the control section by whether high pressure has occurred in a power supply.

[Claim 6] It is the display unit according to claim 1 whose graphic display machine the light source is a high intensity lamp and is a liquid crystal display.

[Claim 7] The display unit according to claim 1 which has the memory which memorizes that a power supply is unusual or did not turn on the light source by the instructions from a control section.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the television receiver which used the light source, a monitor, and a display unit like a display unit.

[0002]

[Description of the Prior Art] The visual equipment containing a liquid crystal display (LCD) and the optical unit containing a projector lens which irradiate light from the tooth back of a screen and can begin to project an image, the light source, the mirror, etc. are arranged, and this kind of display unit is called liquid crystal rear-projection television receiver etc. to the display unit which used the light source. Such a display unit is enlargeable from the television receiver using the Braun tube (CRT) by the ability lessening depth and securing screen area widely.

[0003] Drawing 8 shows an example of this conventional kind of display unit, the light source 1000 for projection is in the tooth-back side of a liquid crystal display 1001, and the lens system 1003 is arranged between the liquid crystal display 1001 and the screen 1002. Such the light source 1000 for projection can be turned on by the power supply 1004 which makes this light source turn on. The current detecting element 1006 is arranged between this power supply 1004 and the microcontroller 1005. This current detecting element 1006 detects whether current flowed in the light source 1000, when a power supply 1004 starts the light source 1000. When the current detecting element 1006 detects that current does not flow in the light source 1000, based on this signal, a microcontroller 1005 can tell having not turned on the light source 1000 by making a display 1007 like light emitting diode (Light Emitting Diode) turn on by the current detecting element 1006 sending a signal to a microcontroller 1005.

[0004]

[Problem(s) to be Solved by the Invention] However, although it can display by the display 1007 when the light source 1000 goes out in this way and the light is not switched on, since the mist beam light source 1000 is not turned on when power supply 1004 the very thing is out of order, the current detecting element 1006 is undetectable in such a case. Therefore, when the power supply 1004 is out of order, it judges that the light source 1000 does not start the current detecting element 1006 too, and since a microcontroller 1005 makes a display 1007 turn on as a result, it cannot judge whether the light source 1000 can start whether a power supply 1004 is failure. For this reason, it does not know immediately whether it is necessary to exchange the light source 1000 and whether a power supply 1004 must be fixed as disposal which a user and a serviceman should take. Then, it aims at offering the display unit which can know immediately certainly whether whether the above-mentioned technical problem's being canceled and the light source's being unusual and the power supply of this invention are unusual.

[0005]

[Means for Solving the Problem] The graphic display machine which projects an image if the above-mentioned purpose is in this invention, and a power supply, The light source which displays on a screen the image which turned on by the electric power supply from this power supply, and has been projected on the graphic display machine by irradiation of light, By the instructions from the control section which receives a powerfail signal from a power supply when power supplies are abnormalities, and receives a light source unusual signal from the light source in not switching [of the light source] on the light, and a control section It is attained by the display unit characterized by having the unusual display which indicates whether a power supply is unusual or the light source is unusual.

[0006] In this invention, the light source lights up by the electric power supply from a power supply. This light source can display the image projected on the graphic display machine by lighting on a screen by irradiation of light. A control section can receive the powerfail signal from a power supply, when power supplies are abnormalities, and in not switching [of the light source] on the light, it can receive the light source unusual signal from the light source. A control section can make it indicate whether a power supply is unusual or the light source is unusual to an unusual

display by sending instructions. those who offer the user of a display unit or service by this have an unusual power supply -- or it can distinguish immediately whether the light source is unusual In this invention, those who do a user or service can know certainly what abnormalities there were in a display unit before by making memory memorize whether a power supply is unusual or the light source is unusual.

[0007]

[Embodiments of the Invention] Hereafter, the gestalt of suitable operation of this invention is explained in detail based on an accompanying drawing. in addition, since the gestalt of the operation described below is the suitable example of this invention, although desirable various limitation is attached technically, especially the range of this invention is not restricted to these gestalten, as long as there is no publication of the purport which limits this invention in a following discussion

[0008] What drawing 1 shows the gestalt of desirable operation of the display unit of this invention, and is shown in drawing 1 is a tooth-back projection type rear projector currently called liquid crystal rear-projection television. The rear projector 1 has the up cabinet 2 and the lower cabinet 3. The rectangle-like frame section 4 is formed in the front-face side, and, as for the up cabinet 2, the screen 5 is attached in the frame section 4. Besides, the section cabinet 2 is made by the core box by which the interior is a cavity and the circumference was closed with the upper surface wall 6, the side walls 7 and 8, the tooth-back wall 9, and the base wall 10. Besides in the section cabinet 2, the mirror 11 shown in drawing 2 is arranged. The screen 5 as the screen is arranged at the anterior of this mirror 11. To the screen 5, a mirror 11 inclines aslant [predetermined / angle] and is arranged.

[0009] The lower cabinet 3 of drawing 1 has held the screen 5 and the device of a projection device 12 and others other than a mirror 11. Loudspeakers 13 and 13, the control unit 15, and the unusual display 16 grade are arranged at the front-face side of the lower cabinet 3. The control unit 15 has two or more operation button 15a. Moreover, the unusual display 16 has two or more light emitting diodes (Light Emitting Diode) 16A, 16B, and 16C etc. To this rear projector 1, it has the attached wireless type remote controller 20.

[0010] Drawing 3 shows the example of a internal structure of the up cabinet 2 of drawing 1 , and the lower cabinet 3. The up cabinet 2 has R (red), G (green), and the liquid crystal display 30 corresponding to B (blue). This liquid crystal display 30 is a graphic display machine for projecting an image, and prism 31 and the lens system 32 are arranged between this liquid crystal display 30 and the screen 5. This prism 31 compounds the picture projected on liquid crystal panel 30C corresponding to liquid crystal panel 30A corresponding to R (red) of a liquid crystal display 30, liquid crystal panel 30B corresponding to G (green), and B (blue), respectively, and a lens system 32 expands the compounded image, and projects it on a screen 5 side. At this time, the enlarged display of the image of a liquid crystal display 30 is carried out by irradiation of the light from the lamp 35 as the light source of the lower cabinet 3 explained later to a screen 5.

[0011] Next, the example of circuitry in the lower cabinet 3 of drawing 3 is explained. The input section 40 can give predetermined instructions from a remote controller 20 to the control section 50 of the lower cabinet 3 by receiving for example, infrared 20A from a remote controller 20. Moreover, it can be ordered predetermined operation to a control section 50 by operation of operation button 15a in a control unit 15. The control section 50 is electrically connected to non-volatile memory 51, the tubular surface display circuit 52, the lamp power supply 53, the lamp 35 (light source), and the unusual display 16. As shown in drawing 1 , two or more Light Emitting Diodes 16A, 16B, and 16C can constitute this unusual display 16. A control section 50 can analyze the signal of the remote controller 20 from the input section 40, or the key input signal from a control unit 15, and can control power-on of the rear projector 1, OFF, etc. by the result.

[0012] The video-signal input circuit 60 can receive broadcast, or can input the video signal from the outside, and this video-signal input circuit 60 can send a video signal MS to an image mix circuit (image MIX circuit). The tubular surface display circuit 52 outputs the power unusual information and disposal information which are told to those who do service which corrects a user or failure to the image mix circuit 61 by being controlled by the control section 50. The image mix circuit 61 mixes the video signal MS sent from the video-signal input circuit 60, and the tubular surface status signal SS sent from the tubular surface display circuit 52 (mixture), and outputs it to each liquid crystal panels 30A, 30B, and 30C of a liquid crystal display 30. A liquid crystal display 30 displays the content of the image mix signal MSS sent from the image mix circuit 61 in this way.

[0013] The lamp power supply 53 outputs the high voltage for turning on a lamp 35 by the existence of the lamp lighting signal OS from a control section 50, or suspends the output of the high voltage. When the output of the high voltage should be given, the lamp power supply 53 detects whether the high-voltage output has come out and the high-voltage output has not come out, the lamp power-outlet malfunction detection signal ES is sent to a control section 50. The high intensity lamp is used, if the high voltage is outputted, the light will be switched on, and a lamp 35 will be switched off if a high-voltage output stops. A lamp 35 sends the lamp detecting signal EL non-switched on the light to

a control section 50, when it is detecting, it understands it whether the lamp 35 is on whether current is flowing and the lamp 35 is not on. The light which a lamp 35 generates can be irradiated from the tooth back of a liquid crystal display 30, can pass each liquid crystal panels 30A, 30B, and 30C of a liquid crystal display 30, and can project them from the tooth-back side of a screen 5 through prism 31 and a lens system 32.

[0014] The non-volatile memory of drawing 3 can store unusual lamp information that the light is not switched on when a control section 50 receives the lamp detecting signal EL non-switched on the light from a lamp 35, and the disposal information that the measures against it accomplished, when not turning on a lamp 35 by the instructions from a control section 50. A control section 50 can read the information stored in such non-volatile memory 51 from non-volatile memory 51, and can also be made to display it on the unusual display 16. That is, the unusual display 16 reports the unusual information which becomes the cause at the time of lamp un-switching on the light, and the disposal information over it to a user by control of a control section 50. Moreover, a control section 59 can display the unusual information stored in non-volatile memory 51 on a screen 25 through the tubular surface display circuit 52 by operation from a user, after the disposal at the time of lamp un-switching on the light which receives unusually is made and a lamp comes to light up normally. A control section 50 consists of a microcomputer, builds in the control program which has a function as shown below, and can control the whole rear projector 1 by performing this control program.

[0015] There is the following as a function of a control section 50.

(1) If the lamp detecting signal EL non-switched on the light from a lamp 35 is read after powering on of the rear projector 1 and it becomes clear lamp un-switching on the light, the lamp power-outlet malfunction detection signal ES from the lamp power supply 53 will be read.

(2) When [whose lamp causes of not switching on the light are the abnormalities of the lamp power supply 53] the lamp power supply 53 is detected as it is unusual, it judges and the abnormalities of the lamp power supply 53 are not detected, it is judging that lamp the causes of not switching on the light are the abnormalities of a lamp 35, and drop the power supply of the rear projector 1.

(3) Store unusual information which was mentioned above to non-volatile memory 51.

(4) The combination of lighting of Light Emitting Diodes 16A, 16B, and 16C (refer to drawing 1) of the unusual display 16 reports the disposal corresponding to unusual information and it to those who do a user or service.

(5) Read the unusual information on past from non-volatile memory 51 to the power up of the rear projector 1.

(6) When a lamp 35 lights up normally in fact [the unusual information on the past read from non-volatile memory 51 to the power up of the rear projector 1 is "unusual", and], store in non-volatile memory 51 that the measures which receive unusually were taken.

(7) When those who do a user or service operate a remote controller 20, or operate the key of a control unit 15 and a control section 50 detects the command of an information display, a control section 50 displays unusual information and disposal information to a screen 5 through the image mix circuit 61 and a liquid crystal display 30 through the tubular surface display circuit 52.

[0016] Next, operation of the rear projector 1 as a display unit mentioned above is explained with reference to drawing 3 , drawing 4 , and drawing 5 . In drawing 4 , at Step S1, whether the user pushed power supply key 20B of a remote controller 20, and when a user pushes a control unit 15, it detects whether the power supply was switched on. When a power supply is switched on, it moves to Step S2 and a control section 50 outputs the lamp lighting signal OS, for example, a High signal, to the lamp power supply 53. Thereby, the electric power supply of the lamp power supply 53 is carried out to a lamp 35. Here, at Step S3, a control section 50 reads the unusual information and disposal information on past from non-volatile memory 51. In step S4, a control section 50 reads the lamp detecting signal EL non-switched on the light from a lamp 35, when a control section 50 detects lamp un-switching on the light, it moves to Step S11, and when the lamp detecting signal EL non-switched on the light is not detected conversely, it moves to Step S5.

[0017] At Step S5, if the lamp 35 has turned on the control section 50 at present when the unusual information on the past read in Step S3 is "unusual", those who do a user or service judge that the measures against un-switching [of a lamp] on the light were performed, and the disposal information is stored in non-volatile memory 51. It means that powering on had accomplished the rear projector 1 normally at this time, and the video signal MS sent from the video-signal input circuit 60 of drawing 3 and the tubular surface status signal SS sent from the tubular surface display circuit 52 are mixed in the image mix circuit 61, and is sent to a liquid crystal display 30 as an image mix signal MSS. When the light which a lamp 35 generates passes liquid crystal panels 30A, 30B, and 30C, the image corresponding to the image mix signal MSS is displayed on a screen 5.

[0018] In Step S6 of drawing 4 , when a control section 50 reads the lamp detecting signal EL non-switched on the light from a lamp 35 and detects lamp un-switching on the light, it moves to Step S11, and when the lamp detecting signal EL non-switched on the light is not detected, it moves to Step S7. At Step S7, a control section 50 progresses to

step S9, when the input signal from the key input of the input section 40 or a control unit 15 detected the command of an information display and it does not move and detect to Step S8.

[0019] In Step S8, a control section 50 outputs the unusual information and disposal information on past to the tubular surface display circuit 52, and the unusual information and disposal information on this past are sent to a liquid crystal display 30 by the image mix circuit 61, and are displayed on a screen 5. In step S9, a control section 50 returns to S6, when detecting the command of power-off, and it progresses to Step S10 and does not detect according to the input signal from the key input in the input section 40 or a control unit 15. Unless there is detection of power-off or detection of the lamp detecting signal EL non-switched on the light henceforth, processing of step S9 will be repeated from Step S6.

[0020] At Step S10, a control section 50 outputs Low as a lamp lighting signal OS to the lamp power supply 53. Thereby, supply of the power outlet to the lamp 35 from the lamp power supply 53 is stopped, and luminescence of a lamp 35 stops. It progresses to Step S11 henceforth, and processing of Step S1 is repeated until powering on is detected. In Step S11, a control section 50 performs processing at the time of detecting lamp un-switching [which is shown below] on the light. As this processing is shown in drawing 5 , in Step S12, it judges that the lamp power supply 53 of a control section is unusual when the lamp power-outlet malfunction detection signal ES from the lamp power supply 53 is read and the lamp power outlet from the lamp power supply 53 has not come out normally (there was a lamp power-outlet detecting signal ES), and progresses to Step S13. When the lamp power outlet from the lamp power supply 53 has come out normally (there is no lamp power-outlet detecting signal ES), a lamp 35 judges that it is unusual and progresses to Step S15.

[0021] In Step S13, a control section 50 stores in non-volatile memory 51 the information that abnormalities were in the lamp power supply 53. In Step S14, a control section 50 reports the information that abnormalities were in the lamp power supply 53, and information, such as calling a serviceman for the disposal for it, for example, repair of the lamp power supply 53, to a user by the unusual display 16 which consists of the Light Emitting Diode display tube etc., and progresses to Step S10 of drawing 4 . In Step S15, a control section 50 stores in non-volatile memory 51 the information that abnormalities were in the lamp 35. In Step S16, a control section 50 reports the information that abnormalities were in the lamp 35, and the information on exchanging the disposal 35 for it, for example, a lamp, etc. to a user, a serviceman, etc. by the unusual display 16 of drawing 3 , and progresses to Step S10 of drawing 4 .

[0022] The following merits arise in such a rear projector 1 that uses the light source.

(1) Taking the measures which were wrong since those to whom whether it is unusually carries out [of the lamp power supply 53 for driving a lamp for whether the cause has a lamp 35 unusually] a user or service understood immediately and the measures against it reported by the unusual display 16 of drawing 3 when the situation of un-switching [of a lamp 35] on the light happened is lost.

(2) Since having taken measures to the abnormalities and it which happened in the past is memorized by non-volatile memory 51 and it can moreover display the content at the suitable time, of course, it is also possible to grasp the failure inclination of the equipment.

[0023] Next, the gestalt of another operation of this invention is explained with reference to drawing 6 . It is the I/O section 140 arranged in the lower cabinet 3, and a remote controller 120 that the rear projector 1 shown in drawing 6 differs from the rear projector 1 shown in drawing 3 . This remote controller 120 and the I/O section 140 can send a signal to both sides using infrared radiation IR. That is, the remote controller 120 has the infrared carrier light-emitting part 121 and the display 122. This infrared carrier light-emitting part 121 and the I/O section 140 of remote control can output and input a signal mutually using infrared radiation IR. Based on the instructions from a control section 50, the same unusual display as the unusual display 16 can be performed in the display 122 of a remote controller 120 through the I/O section 121 of a remote controller 120 from the I/O section 140. that is, it has also set to the unusual display 122 of a remote controller 120 -- it is -- the unusual display 16 in the lower cabinet 3 -- also setting -- any -- the lamp at the time of lamp un-switching on the light -- abnormal -- it is -- trouble indication, such as a lamp powerfail display, the disposal display to it, and the content of an output from non-volatile memory 51 can be displayed

[0024] Of course, it is also possible to be also able to carry out by combining lighting un-switching [of two or more Light Emitting Diodes] on the light as the method of a display of the unusual display 122 of a remote controller 120 or the unusual display 16 of the lower cabinet 3, or to actually display the content using the kanji or a character like the alphabet using a liquid crystal display. Moreover, although such an unusual display 122 is told to those who do a user or service by viewing, what it replaces with this in addition to this, and it tells about with voice etc. or tells about with mere sound is possible.

[0025] Next, with reference to drawing 7 , the gestalt of still more nearly another operation of this invention is explained. Drawing 7 shows the gestalt of still more nearly another operation of the rear projector of this invention. The rear projector 100 of drawing 7 has the light source 135 for projection like a high intensity lamp, the power supply

153, the control section 150, and the unusual display 116 grade. Although these light sources 135, a power supply 153, a control section 150, the unusual display 116, and the malfunction detection section 170 are built in the lower cabinet 3, a screen 5, a lens system 32, prism 31, and the liquid crystal display 30 are built in the up cabinet 2. The light source 135 can use a high intensity lamp, and a power supply 153 supplies the power outlet for lighting to the light source 135. The malfunction detection section 170 is arranged between the power supply 153 and the control section 150. This malfunction detection section 170 is equipped with the high-pressure detecting element 171 and the current detecting element 172. The high-pressure detecting element 171 detects the high voltage which a power supply 153 generates. Moreover, the current detecting element 172 detects whether current flowed to the light source 135 for projection.

[0026] In drawing 7, if a power supply is switched on, since the light source 135 for projection is driven, the power supply 153 for lighting will generate the voltage of a several 10K volt in during starting. The high-pressure detecting element 171 detects the high voltage generated at this time, and information is sent for having operated normally to a control section 150 like a microcontroller. In this case, as information to send, a High signal is sent, for example. Moreover, if current flows to the light source 135 for projection, the current detecting element 172 will detect and information, for example, a High signal, will be sent for having operated normally to a control section 150.

[0027] Next, operation when only the light source 135 for projection is a malfunction is explained. If the light source 135 for projection is a malfunction, in order that current may not flow to the light source 135 for projection, to a control section 150, information is not transmitted from the current detecting element 172. That is, a Low signal remains sent, for example from the current detecting element 172 to a control section 150. If the power supply 153 for lighting is operating normally, the high-pressure detecting element 171 can detect the high voltage, and the high-pressure detecting element 171 will transmit a High signal to a control section 150. Based on these two information, a control section 150 can be judged that only the light source 135 for projection became a malfunction, and, thereby, can tell that the control section 150 blinked for example, Light Emitting Diode 166A of the unusual display 116, and the light source 135 for projection became a malfunction to those who do a user or service.

[0028] Next, the case where the power supply 153 for lighting becomes a malfunction is explained. If the power supply 153 for lighting becomes a malfunction, since the high voltage will not occur, to a control section 150, information is not transmitted from the high-pressure detecting element 171. That is, to a control section 150, it becomes as [of a Low signal] from the high-pressure detecting element 171. It can tell that the control section 150 judged that the power supply 153 for lighting became a malfunction, for example, made Light Emitting Diode 166A of the unusual display 116 turn on, and the power supply 153 became a malfunction at this time to those who do a user or service. Thus, it can tell that the light source 135 for projection is a malfunction by blinking Light Emitting Diode 166A of the unusual display 116, and can divide and tell that a power supply 153 is a malfunction because Light Emitting Diode 166A lights up. Thus, by performing combination of high-pressure detection of a lighting power supply, and current detection, since a failure part understands it while being able to specify clearly which became a malfunction when either the light source for projection or the power supply for lighting becomes a malfunction, disposal of a subsequent failure part can be ensured.

[0029] By the way, this invention is not limited to the form of the above-mentioned implementation. With the form of operation mentioned above, the projected type rear projector using the liquid crystal which has the light source like a high intensity lamp as a display unit is mentioned as the example. However, also in the display unit of not only this but other form, this invention is applicable to distinguishing failure of the light source and the power supply for a drive. Moreover, even if the kind of lamp is the lamp of not only a high intensity lamp but other kinds, of course, it is not cared about. Moreover, it replaces with a liquid crystal display and, of course, a graphic display machine can also use the display of other kinds. As a display unit, even if not classified into an up cabinet and a lower cabinet, of course, it does not matter even if it is the thing of one apparatus. Moreover, even if a remote controller 20 is the thing of not only a wireless [, such as infrared radiation,] type thing but a cable type, of course, it is not cared about.

[0030]
[Effect of the Invention] As explained above, according to this invention, it can know certainly whether the light source is unusual or a power supply is unusual.

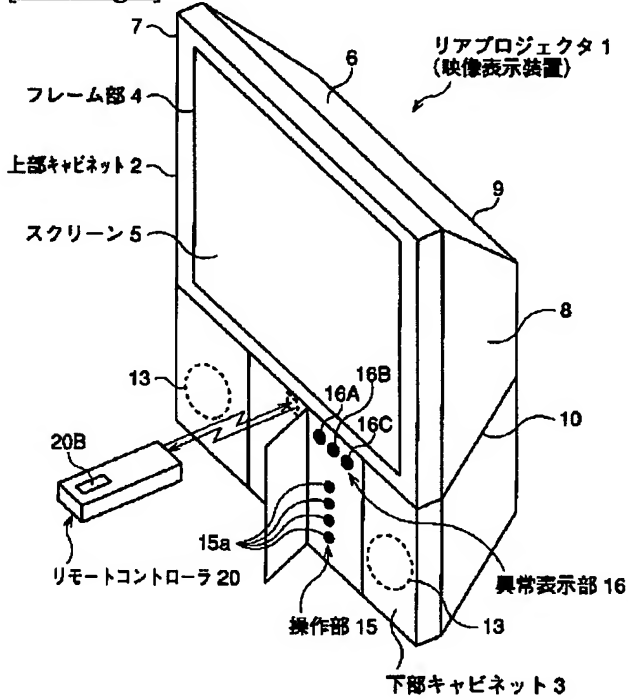
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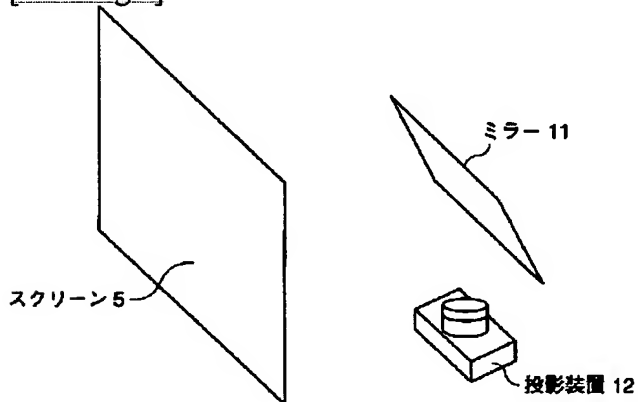
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DRAWINGS

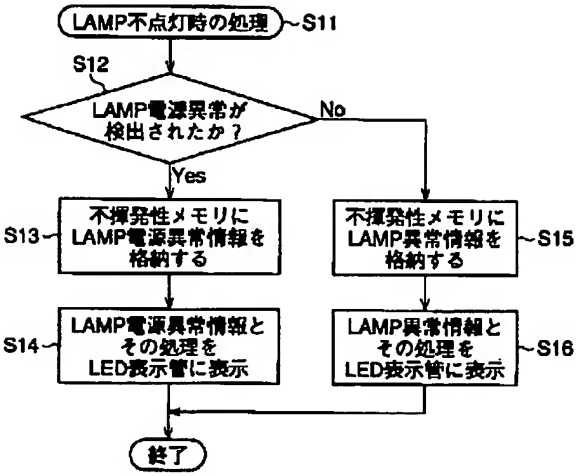
[Drawing 1]



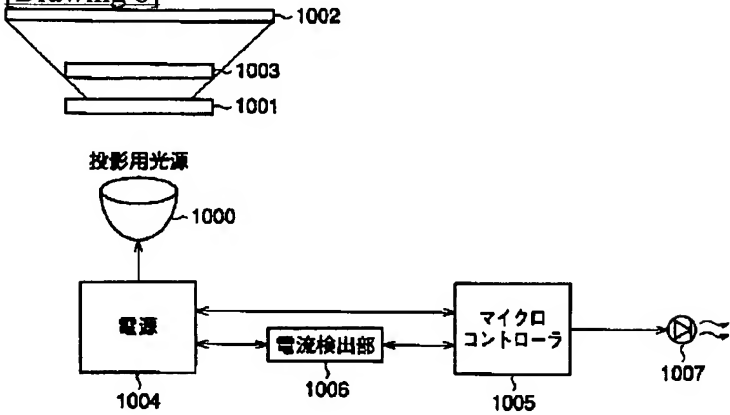
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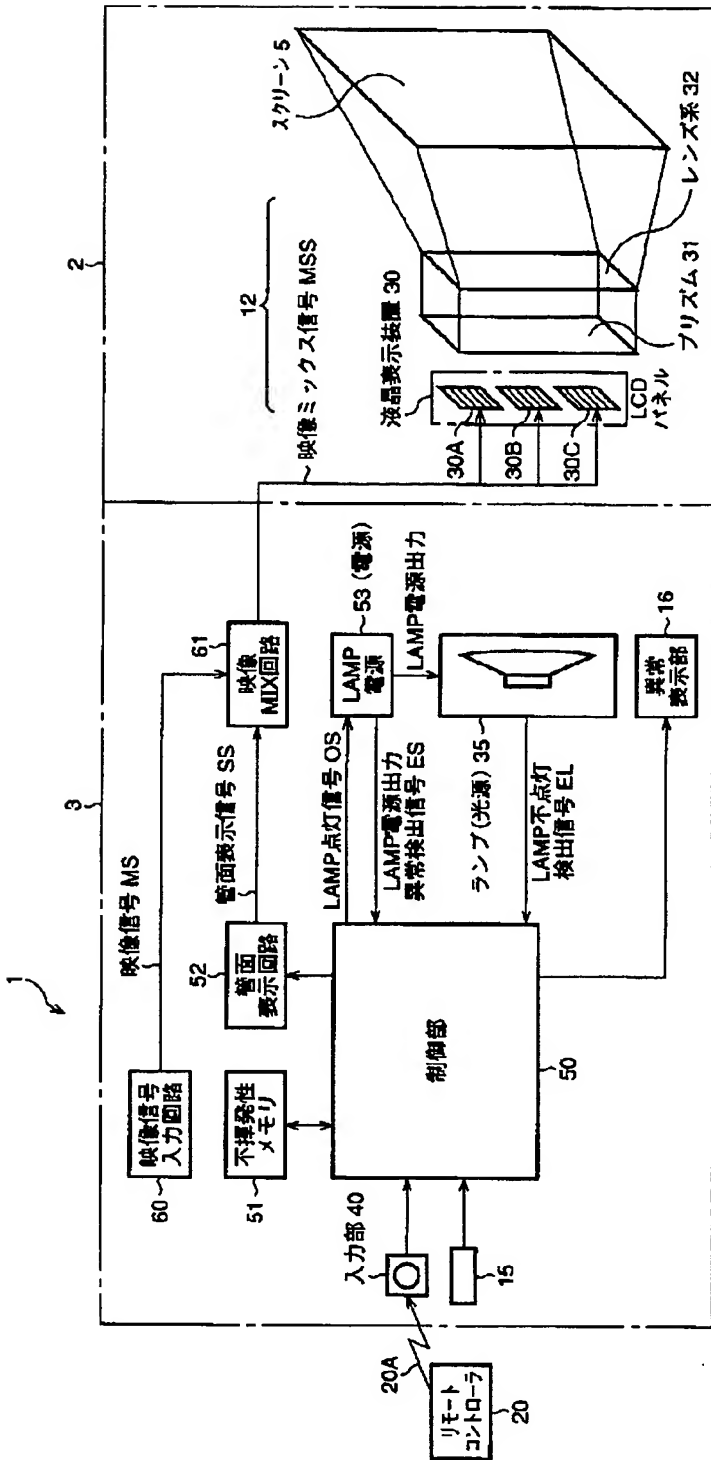
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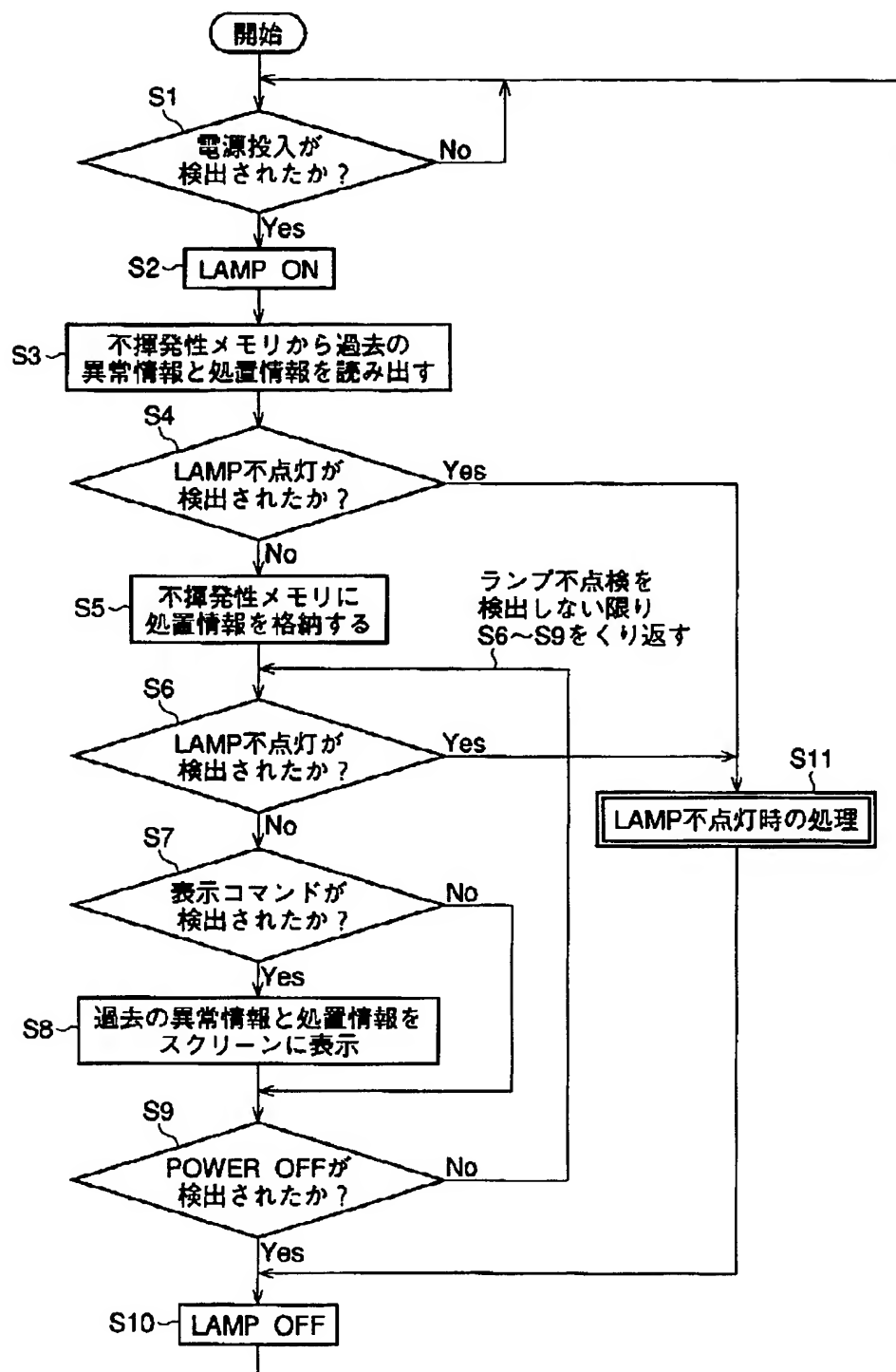
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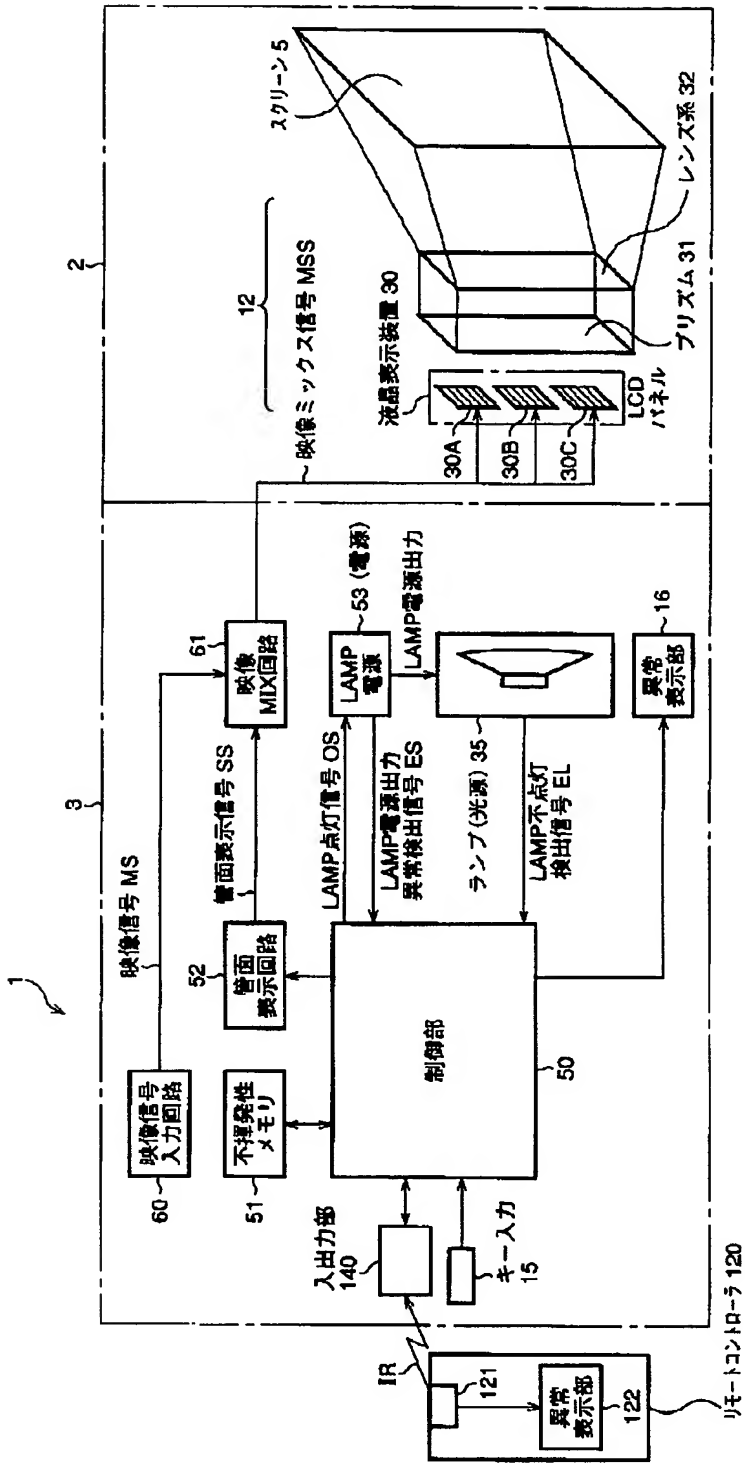
[Drawing 3]



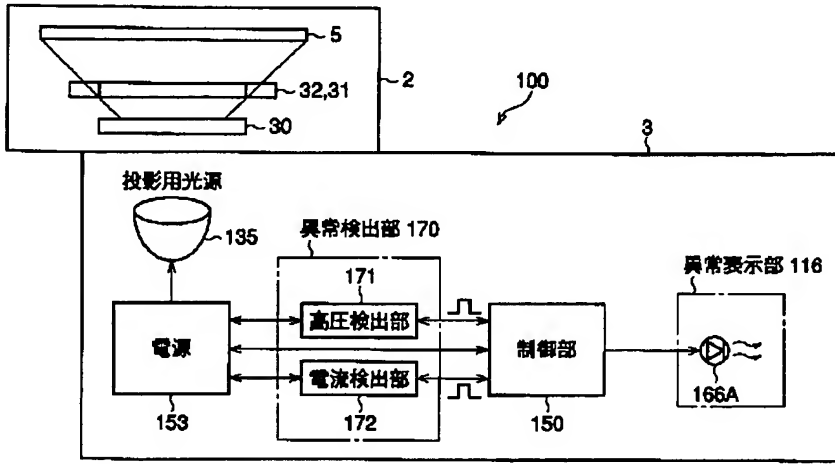
[Drawing 4]



[Drawing 6]



[Drawing 7]



[Translation done.]